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ABSTRACT

The field of scientific and technical communication (STC) has experienced extraordinary growth in recent years. To meet the needs of a new generation of technical communication leaders, a Master's program must include the study of writing, editing, publication, math, computer science, science and engineering literature, rhetorical principles, and genres of the workplace. Graduates in scientific and technological communication must be able to adapt to new technologies, learn methods of collaborative research, be adept at oral communication, know how to integrate print and visual media, and should know the costs and institutional impact of decisions made in communication applications. The faculty teaching such a program should be gathered from a variety of disciplines; facilities should include computer, video, audio, print, and photographic laboratories; and the library should have multidisciplinary holdings purchased from one department's budget. Such a program must also be marketed in order to build it, though not with the purpose of defeating other programs. Good STC Master's programs should support students with assistantships and cooperative ties with industry to prepare students for work in industry, teaching, or further graduate work. (SRT)

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Designing Graduate Programs to Prepare the Communication Leaders of 2000+

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ABSTRACT

Recent years have seen extraordinary growth in the field of scientific and technical communication. Video, computer, electronic publishing, and telecommunications technologies have challenged traditional print dominance among the media. As schools nationwide attempt to meet the needs of a new generation of technical communication leaders, it is well to explore what distinguishes a comprehensive graduate program in this new field. By examining leading programs, assessing industry's needs, and sketching a profile of an ideal graduate communicator, we are able to set goals for curriculum, staff, facilities, resources, support, and administration of a state-of-the-art graduate program in technical communication.

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Designing Graduate Programs to Prepare the Communication Leaders of 2000+

Introduction

The United States and other high-technology countries are facing a shortage of trained technical communicators. Currently, about 30,000 people hold technical writing and editing jobs in the United States. Thousands of additional jobs require expertise in technical communication. The Society for Technical Communication has recently doubled to more than 10,000 members. The Labor Department predicts continuing growth in the technical communication field above the national average, and those graduates with technical coursework in addition to their communication training will be in high demand over the next ten years.[1]

It is not the shortage of personnel, but what the shortage means for the future of technology that is at issue. In 1984, the National Academy of Science reported to Congress that the American research system requires improvement of scientific and technical communication, including "exploiting to the fullest the new communication modes now becoming available."[2] But from where will these trained communicators come? Until recently, no institution had a comprehensive graduate program specifically designed to train such people. Fewer than a score of universities have more than ten years experience offering full technical communication or technical writing programs, even at the undergraduate level. In 1986, however, more than sixty schools are positioning themselves to take advantage of student and market demand. This sudden

explosion of interest has created problems for a discipline still too young to have fully defined itself.

It is ironic that a frequent academic response to these pressures has not been a thoughtful consideration of the issues involved in technical communication and the teaching of technical communicators. It has been instead a rush to capitalize on a potential gold mine of enrollment by adding two or three courses in business or technical writing to an existing graduate program in composition or literature and boldly to announce readiness to train "professionals." This trend is disturbing, especially when several leading institutions have established far more responsible, well-designed programs with the interdisciplinary integrity that is essential in modern communication practice.

This article discusses some of the politics involved in creating graduate programs in technical communication, and we examine curriculum design issues that must be addressed by any school proposing to train competent technical communicators. Although it includes reference to our experiences setting up a Master's program in Rhetoric and Technical Communication at Michigan Technological University (MTU), we are not suggesting that our design is a model (it will, like the other programs, have to be judged over time by the quality of our research and the performance of our graduates). Our purpose is to explore what excellent graduate education in professional writing and communication might be and to initiate a dialog among program directors and faculty about their schools' leadership roles in preparing the next generation of technical communication practitioners and professors.

Surveying the Field

One place to begin thinking about graduate education in technical communication is to examine existing programs. In this review the political implications inherent in curriculum and program design become apparent. Also, one quickly realizes that surveying what exists in terms of graduate education in scientific and technical communication is not as easy as it seems.

There is no consensus about what is meant by "graduate programs" in scientific and technical communication. Courses taught at one institution as undergraduate work (e.g., "technical editing") show up at other institutions as Master's-level, although there are no marked difference in descriptions of content or approach. Such organizations as the Council on Programs in Technical & Scientific Communication (CPTSC) do help the curriculum designer to clarify necessary areas and levels, but there are no absolutes. What one finds depends on how program directors regard technical communication and what vision they have of the roles to be played in society by their programs' graduates.

The issue of what determines graduate work in technical communication runs more deeply than judging what constitutes undergraduate and graduate coursework. There is little agreement on the graduate level about what exactly constitutes a technical communication program. Several very different programs are are vying for a piece of the technical communication- communication market.[3]

First, there are programs leading to the MA/MS or Ph.D. in Rhetoric or Composition that also have options in technical writing. These programs are housed in English departments. The claim of these programs to be considered as places that teach scientific and technical communication lies in the fact that they offer courses in scientific or technical writing. Courses such as "The Language of Business" and "Technical Writing and Editing" are common. The goal of such programs seems to be the training of academics rather than practicing communication specialists, but the problem is that these professors will be trained to teach only the written component of communication. And, as we will argue later, that is not adequate training, regardless of the quality of the writing graduates can demonstrate.

Next, there are "Professional Writing Programs." Most of these are housed in continuing education programs or English departments, but there are essentially two different types. The first type is normally staffed by practicing professionals or a combination of professionals and academics. These programs typically offer students several choices, among them, technical writing is offered as a "Non-Fiction" writing option. The program at USC is among these. Coordinated by the College of Continuing Education, USC's professional writing program features fiction, tv-cinema, and non-fiction courses. Under the non-fiction concentration, there is an option for technical writing. To receive the MA, a student takes 30 hours of courses, mostly taught by established writers in the field. [4]

In these programs, technical communication is quite narrowly defined as technical writing. Little if any attempt is made to tie technical writing to

the larger technical communication context that includes non-print media, design and layout of documents, oral presentations, or the legal and ethical issues of technical communication. Still, because these courses are taught by practicing professionals, one assumes that realistic legal and ethical cases, as well as such things as dealing with managers, artists, and printers are covered. The oversight in these programs is the wholesale lack of exposure to the non-print aspects of technical communication and an overemphasis on applications that results in meagre theoretical and research activity.

Other types of professional writing programs seem to cover more than just technical writing. Carnegie-Mellon's M.A. in professional writing is illustrative of that type. Although housed in the English Department, Carnegie-Mellon's program takes a multidisciplinary approach to what it calls technical writing. In addition to writing, the program provides students with training in visual design, computer technology, rhetoric and linguistics. The degree requires 36 hours of coursework and a 2-hour internship. And because the Communications Document Design Center is housed at Carnegie-Mellon, students are exposed to a strong research component.[5]

Finally, there are about twenty schools offering what they specifically call Technical Communication programs. These programs lead to the MS or MA and to the Ph.D. At present there is only one Ph.D. program in the country, the Ph.D. in Communication and Rhetoric at Rensselaer Polytechnic Institute (RPI).[6] Several other universities, including the University of New Mexico, are in the process of establishing Ph.D. programs.

Currently, there are about 20 MS/MA programs in technical communication in the country. Here we find a few similar course descriptions, but no uniformity of program design. Programs are available from coast to coast and offer a variety of course work based on various required backgrounds. What distinguishes these programs from MA programs in English or rhetoric with options in Technical Writing is usually their breadth of conception. The best of the new STC programs offer more than instruction in writing, choosing to see technical communication as a broader field requiring training in visual and oral communication, skills associated with printing, graphic design, and publication management; and often training in nonprint media including video. These programs often require or encourage work in science, mathematics, engineering or a technical field for either admission or for graduation (e.g., University of Minnesota, University of Washington[7]).

Partly because no one has delineated technical communication as a distinct field, partly because many people who teach technical communication are themselves retrained English professors, and partly because of historical boundaries between disciplines, there is no agreement about who should teach technical communication or how. Surveying existing programs gave us abundant good ideas, warned us away from poorly-conceived purposes, and made us realize that we could not rely on definitions from other programs to create our own.

Assessment of Needs

From the start of our planning some five years ago, part of our purpose in setting up a Master's program was to provide additional leadership to the growing profession, in industry and government and research labs. The other part of our purpose was to meet the extraordinary need for faculty in technical communication programs, both in junior colleges and universities. In so doing, it has been an explicit part of our purpose to challenge and nurture our own faculty as they develop into leading researchers, teachers, and consultants. Consequently, in planning our program, we often had to turn to practicing technical communicators to see what they actually did before we planned our curriculum and policies. What we have discovered has made us aware of how dangerous are the directions which some universities have chosen.

People hiring technical communicators tell us that they do not want graduates who just had a few technical writing skills courses tacked on to another degree. They want graduates of a coherent program that gives students a grounding in theory and a realistic sense of the profession they are entering. Before we could plan a coherent means to serve this ideal graduate, we had to have a complete sense of who these people might be, and what they would be asked to do.

Profile of the Graduate

Our own research showed that STC jobs require a repertoire of skills in several media.[8] Graduates must also have managerial savvy, facility in interpersonal and small-group oral situations, and ability to lead team

projects. This is reflected in Elizabeth Tebeaux's article describing the field, even though her emphasis was on writing programs.[9] Add to these features a generous understanding of how people use writing to learn, how teachers in academic and industrial settings best teach technical communication, and what pedagogical techniques and technologies best support professional practice, and a profile of the desired Master's graduate emerges:

- Must master a heterogeneous mix of specialties--writing, editing, publication; literature of science and engineering; good math, computer science, science, and technology studies.
- Must understand common rhetorical principles of audience analysis, strategies of persuasion and teaching, ethical implications of selected media, usage, and practices.
- Must know the current genres of the workplace, both in industry and government, and also in academic and research settings.
- Must be able to adapt personally, and lead others to adapt, to major changes in communication technologies and standard practices; must be able to conduct thorough analyses of transactional communication situations and the media and technologies suited to each situation.
- Should learn methods of collaborative research, and have team-written pieces in her or his portfolio.
- Should be adept at oral communication, especially in organizational and small-group situations.
- Should know how to integrate print and visual media, and be fully conversant with the architecture and applications of computer-

based and video communications media, including electronic and video publishing.

- Should know the costs and institutional impacts of decisions made in communication applications.

Technical communicators need to know all of this because they encounter more varied work situtations than academics have usually postulated. Also, they tend to be treated, or view themselves, as being flexible and competent in a broad range of situations. Our recent examination of graduates from MTU indicated that 46% of our scientific and technical communication majors were doing technical writing primarily, but that their work involved a variety of media. The remaining 54% were doing a variety of jobs that might or might not involve technical writing. They were in management, sales, video, advertising, design, and "chameleon" roles.[10]

Requirements in Theory and Practice

Because any Master's program encompases too short a period to develop all of the features listed in the profile above, program designers must select those areas they can emphasize most productively. They can also hope to lay a foundation for the other features to be built upon, either on the job or in further schooling. We do not approve of programs teaching only a few writing courses. Despite the fact that one must build on strength, the key in developing a viable technical communication program is balancing local faculty and institutional strength against the needs of the profession and the students' chosen fields.

This is something we had to wrestle with. Thus, the heart of MTU's new program is rhetorical theory, with strong doses of communication theory, computer applications, visual theory and practice, oral practice, and study of composition theory and pedagogy. Other programs have different emphases, which we feel are perfectly appropriate, as long as they are not monolithic or mono-medium.

Thus by starting with our own existing strengths and the vision we have of an ideal MTU graduate, we have been able to decide the courses and structure that make up our program. We are also, from the start, able to advertise the assumptions we have about our graduates' attributes, and thereby help prospective students discover what might best develop the kinds of talents they wish to bring to the communication profession.

Planning the Program: The Critical Issues

A technical communication curriculum as we have come to think of it is different from a technical writing curriculum, although it includes a strong writing component. Technical communication is a blend of written, oral, graphical, political, ethical, practical and theoretical issues. To develop and to maintain such a program is difficult because the field has begun to define itself in cross or multidisciplinary ways. Thus, to begin planning such a program requires planning for flexibility.

Staff

A graduate program's staff has to be gathered from a variety of disciplines. There need to be speech people; reading, writing, and graphics experts;

experts in qualitative and quantitative research design. Because as a faculty we are concerned with writing-across-the-curriculum (WAC), we also felt the need for a cognitive psychologist. The problems with assembling such a collection of people in a traditional department are readily apparent. The department designing the graduate program has to decide early whether or not the plan will be to hire these people internally or whether it will be possible to get other departments to hire in support of a program that is not their own. One can also create a multidisciplinary program modeled after women's studies and ethnic studies programs, but the political infighting and squabbling over territory that has often marked interdisciplinary programs has to be reckoned with when this decision is made.

Even hiring within one's department causes problems. It is often very difficult to hire a person who knows that she or he will be the only person with that speciality on the staff. Faculty are bound to feel some isolation if they are the only psychologist or communication expert in an English department. What is their relationship with their colleagues across campus in Social Science? With colleagues across the country? How will they get tenure? How will their English colleagues judge their work? What are their chances for promotion? For survival? For establishing a feeling of community?

One solution, of course, is that existing faculty can develop additional areas of expertise. Many faculty have interests outside the areas of their Ph.D.s that can help support a multidisciplinary endeavor. The problems that arise from relying solely on retraining existing faculty are obvious.

One could end up with a program in which many or most faculty are teaching outside the areas of their training. This is risky for faculty who are untenured and expected to publish in the fields in which they were hired. It is also hard to get established faculty to give up, for instance, their courses in the Romantics and to expect them to teach only print lab or technical writing.

Facilities

Related to the interdisciplinary faculty problem is the problem of supplies and facilities. To run a technical communication, as opposed to a technical writing, program, one must plan for labs--a concept foreign to most English departments, where notions of instruction run more toward seminar rooms and lecture halls. We considered computer, video, audio, print, and photographic laboratories essential. Other programs may elect to have these or others, but the program committed to technical communication will have to have some laboratory space. The cost of equipment, maintenance, and supplies for these labs is also a serious burden that must be either carried by the department or defrayed, in part, through student lab fees. These are not minor costs, either. The quarterly operation of our computer writing lab has totaled $ 6000, exclusive of faculty salaries. The cost of paper in the computer lab has been $170 for each ten-week term. Disks cost $300; ribbons cost $360; print wheels cost $100, and repairs cost $308 for that same period. Start-up costs of our video classroom for advanced oral communication research exceeded $58,000. Our videotape allowance, for faculty projects done on 1/2 inch Beta tapes alone was $300. Additionally, specialized research facilities need to be planned to

allow faculty to design and carry out the kind of research that emerges from multimedia and interdisciplinary teaching.

Library

Crucial to the development of a graduate program in technical communication- communication is the library. Multidisciplinary holdings to support such a program are essential, and these materials need to be purchased from one department's budget. To implement our new MS program, for example, we began with a grant of $15,000 in one year, in addition to our very modest regular library budget. This allowed us to buy some of the books we had to have and especially 124 journals that we need to support research. This is a huge commitment from the serials librarians who were unwilling to make purchases unless they had high level administrative support that would allow them to maintain these serial holdings at great cost. In order to support our serials and the serials of a few cooperating departments across campus, the library had to extract a promise from the administration that $90,000 a year would be available into the foreseeable future. Also, many of our 124 journals were purchased starting in 1985. That means we still must rely on interlibrary loan to obtain copies of articles. Libraries cannot copy whole journal issues, and the copyright laws also prohibit the library from asking for a single journal more than just a few times over the course of the entire year.

Deciding what should be in the library is a problem in itself. Without the faculty needed to run a MS program, one has to purchase library holdings without the benefit of the expertise of those people whose research and teaching would rely on them. And, without such holdings, it is hard to

attract practicing scholars. The field is still so diverse that the librarians were frequently at a loss to help us decide what the definitive works would be in certain parts of the field. The canon of technical communication has yet to be set. Nevertheless, we discovered that many faculty, when given the chance to participate in the selection process, gave willingly of their time and knowledge to build the library base that our new students need.

Marketing

Selling a new (or existing) technical communication program is not without its problems as well. Who one sees as potential students has a lot to do with how the program will be marketed. Are students to be recruited from undergraduate stc programs? If so, how many of one's own students (if any) do we want to attract? Do we want to appeal to other majors (biology? dance? civil engineering?) whose job prospects would be enhanced with a master's in communication? Do we want industry people looking to up-grade their skills? Questions like "What kind of mix do we want?" must be addressed before any kind of marketing program can be designed. University pressure for numbers of students of any kind may have an influence as well.

Once these questions have been addressed, the actual marketing plan must be developed. For help with this task, we asked Dr. Paul Anderson of Miami University, who generously shared his comprehensive advertising plan. Paul had begun in January, 1983, with a direct-mail campaign. The major elements of Miami's effort included 12,300 brochures (national database and minority locators; 2% response rate); and 3,000 posters (mailed to a 10-state region only, 6.6% response rate). This campaign netted 595

responses, 40 completed applications, and 15 students accepted for the Fall, 1983 class.

Our own effort is not completed yet. We began mailings in early February, 1986, but we already have more than 120 requests for applications and have accepted 14 students so far for the fall. Learning from Miami's experience, we direct-mailed to only a six-state region--some 3,500 brochures. Because recent market research shows that referrals by colleagues at other institutions are important, we've made an effort to let all our friends know about our program (direct faculty-to-faculty contacts), and we have advertised in the CCCC program and in the issue of Technical Communication that appeared one week before the 1985 ITCC meeting in Detroit.

Marketing often connotes fierce competition. We do not share the view that we must fight to defeat other programs in order to build our own. We feel that graduate STC education, being ideally interdisciplinary and pluralistic, ought also to be a reciprocal enterprise--we try to send our graduates to Miami, Bowling Green, RPI, Penn State, University of Minnesota, and other established programs, and we keep their materials displayed in our students' office area. We also run articles and notices in our student newsletter. Faculty at those institutions have agreed to do likewise for us. This is a healthy and mutually beneficial spirit that we hope to maintain as the field grows.

Student Support

Support of graduate technical communication students raises a number of complicated issues. Most of the people we have accepted into the program in our first two years are not former STC majors. Almost all of the people who have applied to our program bring with them a variety of skills, but most are not ready to be put into a classroom to teach technical writing, video, speech, or graphics. And because the university requires that students be able to graduate in 12 months (though they usually take longer), we do not have the luxury of having them work with us a year before they begin teaching. This year, we offered Teaching Assistantships to outstanding people; one is a biologist, one a psychologist, and one a reentry student with a business degree many years old. How do we maintain the standards of our technical writing programs under these circumstances?

One answer lies in supplying students with alternative ways of supporting themselves. This means that research assistantships and cooperative ties with industry have to be strengthened. This is much easier to say than it is to do because it requires a large expenditure of someone's energy and time. And that brings us to the last issue in discussion developing graduate programs--administration.

Program Administration

An interdisciplinary technical communication program needs a steering committee's attention. Although the development of a graduate program

certainly depends on a clear focus, it is simply too complicated for one person to plan alone or to judge all applicants for admission and teaching assignments. There are too many different aspects of technical communication that need to be represented in a good graduate program for one person to do a thorough job. Our applicants, for example, are dance majors, applied physics majors, people who have been chemists for the last 20 years at EPA. Our courses cover everything from the history of rhetoric to advanced video production to oral communication and publications management.

Design of good programs or programs that hope to be good have to be coordinated, supported administratively with released time, and to be seen as central to the university's mission. They are hard to create and sustain, but they are worthwhile; they serve a necessary role in the world, and they are exciting to be part of.

Conclusion

With visions of large enrollments, lots of universities are crowding into the technical communication marketplace. We need to insist on developing these programs' integrity before we have too many faculty careers and too much money invested to allow change to occur. Perhaps these new programs need accreditation. If so, we should decide who will do the accrediting. We also need to educate students so they know what they are getting. Programs cannot afford to have the students who come from solid undergraduate technical communication programs bored and disillusioned by graduate programs that either duplicate the undergraduate curriculum or

that do not adequately prepare them for work in industry, teaching, or further graduate work.

Some solutions to these problems lie in consortia, activity in professional organizations, articles and research, surveys of graduates, and seminar discussions of the issues.

For us, the ideal program is one that allows us to build on our undergraduate program. That means, we have to offer at the graduate level things not available at the undergraduate level. By looking at strong programs we have learned that we must plan a program that builds on a department's strengths. RPI has done so by making good use of its connections to IBM and by its emphasis on communication theory. Carnegie-Mellon has built on its strength in document design. We hope to do the same by building on our strengths in WAC, computers, and visual images in communication.

At the same time, we want to continue to strengthen the multidisciplinary nature of our program, to build closer ties with professional communicators working in the field, and to support the professional development of our faculty. We want to be responsive to the needs of the practicing professional. Yet, we recognize that it should be part of our role to offer leadership. To raise ethical and moral questions, to suggest research areas that will help make technology more accessible, and to work for quality performance and vision in the national organizations that affect technical communications practices and policies. Before the new generation of technical communication leaders take over, there is yet much work for us as we lay the foundations for 2000+.

[1]See the current edition of Occupational Outlook Handbook.
[2]National Academy of Science, "Five-Year Outlook," 1984.
[3]See Opportunities in Technical Communications, Ed. Jay R.Gould and Wayne A. Losano, VGM Career Horizons (National Textbook Company, Lincolnwood, Illinois, 1984).
[4]USC Bulletin, Continuing Education Volume.
[5] See Carnegie-Mellon University Bulletin, "The Professional Writer: A Communications Problem Solver."
[6]See Rensselaer Graduate Catalog, 1985-86.
[7]At Minnesota, the Technical Communication program is organized under the Rhetoric Department of the Agriculture College; its new Master of Science in Technical Communication will begin in fall, 1986. The program requires technical work; see the "Agriculture" and "Graduate School" numbers of the 1985-87 University of Minnesota Bulletin. Also set to start in fall, 1986, is a Master of Science option in Scientific and Technical Communication at the University of Washington, Seattle. Calculus and a bachelor's in engineering or science (or three years related experience) are required for admission.
[8]James Kalmbach, John Jobst, and George Meese, "Education and Practice: A Survey of Graduates of a Technical Communication Program," Technical Communication, Winter 1986, pp. 21-26.
[9]Elizabeth Tebeaux, "Redesigning Professional Writing Courses to Meet the Communication Needs of Writers in Business and Industry," College Composition and Communication, December 1985, pp. 419-428.
[10]Billie Wahlstrom and Margaret.Boos, Survey of STC Students, 1986, Unpublished.